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ABSTRACT

An attempt was made to develop self-directedness in students through teaching them how to write questions in multiple-choice format, and by making students aware that phrasing things in multiple-choice format is a way of asking questions that is conducive to developing thinking, writing, and test-taking skills. The study, a form of reflective inquiry, was conducted in three classes, one each of grades 2, 3, and 4, in low-income urban areas. Five sessions were held in each of the classes. Students first heard a passage, and then attempted to make lists of key words related to the reading. With instruction, they developed multiple-choice items for the material. By the end of the third week, almost all of the students, even in grade 2, understood the importance of framing a correct answer and "good, wrong" options and recognized how much effort it took to work through the chain of possible answers. The teachers indicated that the process had been beneficial and were happy to continue working with it. Teachers thought the approach was particularly useful in developing thinking skills and reinforcing good test-taking skills. An appendix summarizes the philosophy of the study and presents achievement scores in reading for these classes in January 1990, and for 1 and 2 years previous (not available for grade 2). This information is not presented as outcome information for the study, but is cited to provide context material about the students. Seven data tables are included. (SLD)

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TRAINING STUDENTS TO TAKE BETTER CONTROL OF THEIR LEARNING BY FRAMING QUESTIONS IN MULTIPLE-CHOICE FORMAT

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Paper presentation,
Symposium on:

GOAL SETTING AND REFLECTIVE THINKING STRATEGIES FOR SELF-DIRECTED LEARNING

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ABSTRACT

Most of the events happening in today's world reemphasize the need for well-educated citizens. These events also drive home the message that being well-educated now, more than ever, means being a self-motivated, self-directed learner. This symposium is about a variety of ways to promote self-directedness in students. This paper is about an attempt to develop self-directedness through teaching students how to write multiple-choice items.

Teaching students to write multiple-choice items was seen as important for self-direction not for the sake of developing item-writing skills per se, but for the purpose of making the students aware that phrasing things in multiple-choice format is just another way of asking questions, and a way of questioning particularly conducive to developing thinking and writing skills, not to mention test-taking skills.

The study was regarded as a form of "reflective inquiry" and was conducted in three classes in low-income schools. The teachers involved perceived the approach as being effective in improving thinking and test-taking skills.

TRAINING STUDENTS TO TAKE BETTER CONTROL OF THEIR LEARNING BY FRAMING QUESTIONS IN MULTIPLE-CHOICE FORMAT

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I. INTRODUCTION

Today's world emits a continual stream of signals alerting us to the fact that working adults in a democratic society have to be not only educated, but able to function as autonomous, self-motivated learners. The same kind of message is carried in the contrasting, yet corroborating, news of the many unemployable high school graduates whose diplomas translate into little or no competence to perform as learners on their own. The conclusion seems clear that there is an urgent need for our schools to produce self-directed learners. In fact, it seems incumbent on our educational system to make "self-directed," as applied to "learners," as redundant as possible, as quickly as possible. Shanker (1990) made this same point again recently--as he has done many times--in urging schools to become radically different:

> Our schools are based on a fundamentally mistaken idea about the role of students in their own education. The traditional model of education sees students either as vessels into which knowledge must be poured or as raw materials that the education process turns into finished products. . .But people become educated because of the work they do. No matter what the root meaning of the word educate is, no one can educate you. You must talk, you must read, you must imagine, you must build, you must listen. . .
>
> (p.349)

Becoming a self-directed learner can mean many things. Here the point of view is taken that it essentially means overcoming, at some point, that major developmental hurdle which allows an individual to function in ways more fundamentally complex than ever before. It means the individual has solved the "learning paradox," which Bereiter (1985) sees as being at the heart of problematic learning:

> . . .It has been suggested that learning is problematic when it involves acquiring a more complex cognitive structure, to which prior cognitive structures are assimilated, and non-problematic if it involves only combining or adding elements to existing cognitive structures.
>
> (P. 221)

It is in this connection that Bereiter (1985) suggests the ten principles that "seem to hold promise as contributions to a theory of how bootstrapping can occur in cognitive development": 1) Chance Plus Selection, 2) Piggy-Backing, 3) Affective Boosting, 4) Field Facilitation, 5) Imitation, 6) Learning Support Systems, 7) Bias, 8) LC Learning, 9) Use of Spare Mental Capacity, and 10) Need for a Coherent Self-Concept (pp. 208-214).

Self-directed learners must not only become effective in a number of these "bootstrapping" strategies, they must also, while they are still in school, become successful in what Leinhardt and Putnam (1987) call the "skills of learning from classroom

lessons," i.e., the skills necessary to establish and maintain--while introducing as much autonomy as possible--an adequate "action system," and effectively function in relation to this system as "lesson parsers," "information gatherers," "knowledge generators," and, finally, lesson "evaluators."

From the other side of the coin, in terms of what the professional educational community owes students, to be able to assist them in the task of becoming self-directed learners, there is still a long way to go. Glaser (1990) reminds us that modern cognitive science decided first to turn the bulk of its attention to the intricacies of competent performance, and is only now getting back to learning theory concerns, i.e., the "acquisition and transition processes" that bring about competent performance.

Snow (1980) had earlier described the intricate nature of this competent performance, which learning theory now has to overtake, as follows:

> . . .School achievement is no longer to be understood as simply the accretion of facts and content specific skills. Certainly, bits and amorphous masses of information are internalized, and specific habits of thought and action are acquired. But educational learning is not just cumulative in the old associationistic sense; a significant part of the learner's task is continually to assemble, reassemble, structure, and tune the cumulating body of knowledge into functional systems for use in thought, and in further learning. Thus, achievement is as much an organization function as it is an acquisition function. And new achievement depends as

> much on transfer of such organization as it does on transfer of specific prior skills and facts. . .As one emphasizes the representation and reorganization of knowledge, and use of new retrieval schemes and strategies, ability constructs reenter the interpretation of achievement. . .organization, generalization, facile adaptation and application of knowledge in new contexts; that is what. . .is meant by "verbal and quantitative ability" or "scholastic aptitude" or "crystallized intelligence". . .
>
> (Snow, 1980, p. 43)

This entire symposium is about several studies/projects in which a number of Bereiter's (1985) bootstrapping strategies were matched with various levels of inquiry (see Bereiter and Scardamalia, 1986) in an effort to contribute to the knowledge base--the learning theory and the delineation of competent performance--needed to promote self-directed learning. This paper is about a study to develop self-directedness in students by teaching them how to write questions in multiple-choice format. Among a number of recent statements in the professional literature that might be cited at this point in support of this approach are the following conclusions from Strother's (1989) summary of research on questioning and thinking skills:

> To involve students more actively in their own learning, researchers suggest that students be trained to ask questions, as well as to answer them. . .
>
> Teachers do not usually teach students how to learn. . .As students take the time to

> raise questions of their own, Hunkins believes that we will begin to see a relationship to higher-order thinking. . .
> (p.327)

This study made a point of training the students to produce multiple-choice items not so much for the items' sake as for the thinking and writing demands this required, and the paper will approach the study from this perspective. It will take a brief look at the professional literature regarding a) conceptions of instruction and learning, and the position self-directed learning has to occupy between learning and instruction, and b) the role of questions--and types of questions--in evoking self-directed learning. A description of this particular study will follow, including its findings, but giving special attention to the study as a form of "reflective inquiry" in the sense of Bereiter and Scardamalia's (1986) schema, and noting the importance of this kind of research and underlying viewpoint in studying educational phenomena.

II. INSTRUCTION/LEARNING/SELF-DIRECTED LEARNING

A. The Nature of Instruction/Learning

There are few educational researchers and theorists today who do not subscribe to the view that learning is an active, constructive process. Winne (1989) has developed a six (6) part characterization of "intelligently designed

instruction" (pp. 234-241) that he feels matches this active learning model:

Part 1: Students must think to learn.

Part 2: Telling is rarely sufficient to assure effective cognition.

Part 3: In skilled instruction, cues guide students' cognition.

Part 4: Instruction = Telling content + cuing cognitive operations.

Part 5: Obstacles to reliable effects of cuing
- Students may not register cues.
- Students may mismatch cues to cognition.
- Students may not be able to perform cued cognitive processing.
- Students may not be motivated to act in accord with cues.

Part 6: What operations can cues cue?
- S stands for stimulating
- M represents monitoring
- A symbolizes assembling
- R is for rehearsing
- T represents translating

(SMART)

Winne (1989) does not extend his characterization of instruction to the point where self-directed learning enters in, but the implication that students must become more and more responsible for their learning seems to be present in his whole line of thinking.

Langer and Applebee (1986) move the discussion of instruction in the direction of student autonomous learning with their emphasis on teaching/learning convergence. Although they are particularly concerned about reading and writing instruction, their arguments in favor of the interaction/merging of teaching and learning, and, by implication, the establishment of autonomous learning, do not seem to be restricted to these two areas. They see the need for a theory that "systematically relates individual development to the social processes that surround it" (p. 171). They state their case more specifically as follows:

> . . . Reading and writing development are individual processes which reflect the evolving skills of the individual language learner. Instruction, on the other hand, is a social process, rooted in the interaction between teacher and student. Through the intersection of development and instruction, individual learners gain the power to use language to understand their world and to act within it. (p. 171)

Langer and Applebee (1986) do not think a satisfactory, full-blown theory meeting these convergence requirements is available as yet, but think it will eventually have to contain at least the five (5) components of their model of "effective instructional scaffolding" (pp. 185-188):

1. Ownership - . . . "gives students the room to have something of their own. . ."

2. Appropriateness - . . . "builds on literacy and thinking skills the students already have . . ."

3. Structure - . . . "tasks (that) make the structure of the activity clear. . . "

4. Collaboration - . . . "interactions (that) build upon and recast student efforts without rejecting what the students have accomplished on their own . . . "

5. Internalization - " . . . control of the interaction is gradually transferred from the teacher to the student. . . "

There is considerable congruence between Langer and Applebee's (1986) call for this highly interactive form of teaching and learning--resulting eventually in autonomous learning--and Brown's (1989) statements regarding the need for students to perform at the level of the "higher literacy" (analysis, critical thinking, evaluation skills, for example) that our present world demands. He reminds us--continually linking teaching to testing:

> . . . The new literacy of thoughtfulness calls for a quite different technology of teaching and testing; it rests on quite different notions about the nature of knowledge and learning because it is about the making of meaning, not just the receiving of it . . . (p. 32)

He also, as the director of the project on "Policy and the Higher Literacies," discovered that "The best tests of thoughtfulness I

saw in my travels were student generated. . . " (p. 33), a point to be repeated later. This thoughtfulness theme is also the preoccupation of Wiggins (1989), who argues: "The modern educational task is to put students in the habit of thoughtful inquiry, mimicking the work of professionals" (p. 47).

If students are to arrive at the stage where they can "mimick the work of professionals," they must be highly motivated, as Winne (1989) has already stressed, and as Langer and Applebee (1986) make clear in their development of the "ownership" and "internalization" elements of their model. Dweck (1986) would seem to be of the same mind. She stresses that the concept of motivation has evolved considerably in recent years:

> In the past 10 to 15 years a dramatic change has taken place in the study of motivation. . .During this time, the emphasis has shifted to a social-cognitive approach--away from external contingencies, on the one hand, and global, internal states, on the other. It has shifted to an emphasis on cognitive mediators, that is, to how children construe the situation, interpret events in the situation, and process information about the situation. . . (p. 1040)

Dweck's and others' approach has generated research, for example, which makes it clear that children's adaptive and maladaptive behavior, as regards intellectual ability, can be explained as follows:

> . . . Basically, children's theories of intelligence appear to orient them toward different goals: Children who believe intelligence is a fixed trait tend to orient toward gaining favorable judgment of that trait (performance goals), whereas children who believe intelligence is a malleable quality tend to orient toward developing that quality (learning goals). The goals then appear to set up the different behavior patterns. (P. 1041)

Along somewhat similar lines, Bereiter (1985), as noted earlier, pointed out the usefulness of a coherent self-concept among several "bootstrapping" strategies available for solving the "learning paradox." This idea is developed by McCombs and Whisler (1989) specifically with regard to autonomous learning.

B. Self-Concept and Autonomous Learning

McCombs and Whisler (1989) have developed a series of principles that "begin to integrate what we know about the structure and function of the self-system as these relate to the role of affect in autonomous learning" (P. 283). Their seven (7) principles are as follows (pp. 283-298):

Principle 1: Human behavior is basically motivated by needs for self-development and self-determination.

Principle 2: The self-system operates as the base set of "filters" through which all information is processed, transformed, and encoded.

Principle 3: The self-referent nature of this filtering process serves the purpose of maintaining illusions of control or self-determination that lie at the base of self-esteem maintenance.

Principle 4: Self-reference can become an effective strategy for generating motivation to learn and for producing more effective learning.

Principle 5: Affect plays a major role in self-esteem development, motivation, and the engagement of self-regulated learning processes and strategies.

Principle 6: Autonomous learning is an inherently natural process driven by the need to fulfill personal self-development and self-determination goals.

Principle 7: The degree to which self-system structures and processes positively impact affect, motivation and autonomous learning is highly dependent on developmental and environmental factors.

It is especially the kind of intervention which the latter two principles support that is the concern of this paper, and, more particularly, the form of constructive intervention that teaching students question-asking skills seems to offer.

C. Questions as Means to Self-Directed Learning

Brown (1989) was cited earlier as one who was convinced of the value of teaching students not only how to develop questions, but how to develop tests. His reasoning is that "Nothing helps you master a subject better than having to ask and debate fundamental questions about what is most important about the subject and how you could tell if someone else had mastered it." (p. 33) Wiggins (1989), also cited above, states the value of students learning how to question even more strongly, arguing that the ". . . aim of curriculum is to awaken, not 'stock' or 'train' the mind. That goal makes the basic unit of modern curriculum the question." (p. 46)

Marzano et al (1988) have included "formulating questions" as one of their Core Thinking Skills (Information Gathering Skills), and make the point that "Despite the dearth of research on student questioning, it is important for students to learn and to practice this skill." (p. 75) Among those who have researched/done research in this area, Wong (1985) concluded a comprehensive review of "self-questioning instructional research" with the statement:

> . . .Despite the differential nature of instructional questions, self-questioning instructional studies emanating from those three theoretical perspectives (active processing theory, metacognitive theory, and schema theory) have been efficacious in enhancing students' processing of prose.

> Instructional studies that failed to achieve the intended benefit of self-questioning instruction on students' prose processing have consistently shown one or more of the following problems: insufficient training prior to administering post training tests, lack of explicitness in or direct instruction on generation of questions, and insufficient processing time allowed students to read given passages and to generate questions. . .
> (p. 250)

Davey and McBride (1986) conducted a study of 125 sixth-grade students regarding the effects of "question generation on comprehension question performance, on quality and form of generated questions, and on accuracy of predicted comprehension." (p. 256) They concluded that the study overall showed positive effects in all three of these areas and provided "important support for the 'active processing' view of question effects," as well as support for the metacognitive theoretical viewpoint. (p. 260) They also concluded that "Perhaps a major contribution of this study was that a rather brief, generalizable intervention could make such a difference." (p. 260)

Before the paper focuses on the study itself, it is important to take a brief look, from a conceptual point of view, at the importance multiple-choice questions can play in developing self-directedness in learning.

III. MULTIPLE-CHOICE QUESTIONS

At this point, there seems to be only one explicit statement in the professional literature proposing that there are benefits to students in being able to generate multiple-choice questions. Wimmers (1989), even though he seems to have secondary or college level students in mind, has insights that seem to have widespread applicability:

> . . . the devising of sets of multiple-choice questions on a poem or prose passage can be a useful exercise for both teachers and students, because it obliges them to confront the question of what a reader must deal with in a text in order to arrive at an understanding of it. Further . . . the format is instructive in showing us the limits of consensus, in revealing the aspects of the text about which we can agree, and in establishing a boundary where objective understanding ends and subjective response and interpretation begin. Finally, such an exercise is useful because it requires a reader to scrutinize the text critically, with an eye not only to his own response but to that of the other readers who may be obliged to answer the questions he has devised.
>
> (p.24)

The ability to generate multiple-choice questions also seems to be a direct means of addressing Corley's (1988) concerns that poor readers have "immature sentence comprehension strategies that are 'top down' in nature (are overly reliant on semantic information) and fail to fully integrate surface phonetic and syntactic features of language."

(p. 59) These children have severe problems in making the "transition from 'learning to read' to 'reading to learn,'" (p. 70), and Corley (1988) advocates a strategy proposed by Weaver--which seems to have much in common with developing multiple-choice item-writing skills:

> . . . early reading instruction might be enhanced by instructional techniques that foster awareness of the surface syntactic features of language. Weaver . . . developed a "sentence anagram task" in order to promote children's sentence organization skills. Children memorized a systematic sequence of "wh" questions to ask themselves while searching for sentence components such as subject, verb and object. Although the strategy could not be specifically applied during reading, Weaver hypothesized that the overt manipulation of sentence structure would better attune children to surface structural cues while reading. (p. 71)

As a final note for this section, it seems important to point out that the writing associated with skills for generating multiple-choice items seems a particularly important example of writing as a "complex problem-solving" activity (see Hayes and Flower, 1980), especially when this takes on the broader sense of "problem finding" related to re-defining the problems/goals in the course of writing.

The final section of the paper, which follows, describes the study which attempted to develop multiple-choice item-writing skills in students as a means of promoting self-directed learning:

IV. THE MULTIPLE-CHOICE ITEM-WRITING STUDY

A. Some Technical/Theoretical Issues

Before dealing with the specific activities included in the study, some technical/theoretical issues need to be briefly addressed.

The study was structured essentially as a form of "reflective inquiry," i. e., Level 1 in Bereiter and Scardamalia's (1986) terminology. (There was also a slight, intitial attempt to move the study to their Level 2, Empirical Variable Testing.) Reflective Inquiry, as already noted, is Level 1 in Bereiter and Scardamalia's Levels of Inquiry schema, which, overall, ". . . provides a framework within which research on various questions, using diverse methods can be brought into conjunction. . ." (p. 259) As their Level 1, Reflective Inquiry is seen as having these characteristic questions, and using these typical methods (p. 261):

Characteristic Questions	Typical Methods
•What is the nature of this phenomenon?	•Informal observation
•What are the problems?	•Introspection
•What do the data mean?	•Discussion, argument, private reflection

Level 2 (Empirical Variable Testing) would, of course, introduce questions like "Is this assumption correct?", "What is the relation

between x and y?", with concomitant use of different types of data collection operations and statistical analyses.

It was considered appropriate to conduct a Level 1, Reflective Inquiry, study in this area at this juncture, because the effort is still completely exploratory. There were other reasons also, related to what seems to be the most useful purpose for engaging in this kind of endeavor. The term "study" is used here because this activity was a "study" in the most basic sense of the term, but it is not used in what has become a more recent, automatic connotation, i.e., that this is a research study associated with a specific, funded project of some kind. This study was not a "project" as the term has come to be, perhaps too frequently, used in education. Rather, the study was an inquiring look at a process that might prove useful to teachers on a regular basis, without trying to isolate specific dependent/independent (experimental /control, etc.) variables. The goal was to work with teachers and students, and then turn the process over to them to continue if it seemed successful. Using the latter term, "successful," in this context brings up several other issues that seem pertinent.

This discussion is not an attempt to keep the "paradigm wars" going (Gage, 1989). In fact, there is basic agreement with Gage when he says:

> The answer to the future lies with us, with you. What you do in the years ahead will determine whether the wars continue, until one paradigm grinds the others into the dust. Or, on the other hand, whether pragmatic philosophical analysis shows us the

> foolishness of these paradigm wars and the way to an honest and productive rapprochement between the paradigms.
> (p. 10)

At the same time, the study clearly seems to have much in common with the thinking of Gibboney (1989), which holds that educational research at present is more "technological" than "scientific" (p. 226), and it endorses his recommendation:

> . . . let us stop trying to make data clusters into science when there is no conceptual framework to given them scientific and intellectual coherence. Instead, let us pursue new ends by more diverse and richer means. By such moral acts we move outside the technological cave and into the light of meaningful intellectual inquiry--however unscientific that inquiry may be in our time. (p. 227)

There is another perspective which seems appropriate for this kind of study, and which seems to represent one more example of opening up the domain of "meaningful intellectual inquiry." This is the perspective touched on by Tittle (1989) in her discussion of the uniqueness of teachers' knowledge and how this singular form of knowledge is brought to bear in their construction of meaning from assessment data collected in their classes. It is particularly, however, the perspective introduced by House, Mathison and McTaggart (1989), when they "advocate an expanded and pluralistic conception of validity" based on "practitioners' causal inferences" (p. 15). These authors contend that the world of practice, i.e., the everyday world of the classroom, has much

more to do with "intentional causation" than the "regularity theory of causation." In intentional causation, ". . . the causal nexus is internal to the experience itself: part of the experience of acting is an awareness that the experience itself is causing the action". (p. 15) Intentional causation opens the door for broader conceptions of validity in educational investigations, and it seems that studies like the present can begin to contribute to an understanding of the practitioner's world. House, Mathison and McTaggart (1989) see the need for this understanding as follows:

> Unfortunately, we don't know much about practitioners' inferences or how they arrive at them. We have few procedures or resources for helping teachers and other practitioners improve their critical inferences. Although the validity considerations in the experimental modes of reasoning have been fully explicated, the inferences critical to practice lie hidden, subterranean. We must invent new ways of helping practitioners improve their causal inferences if we want to improve practice. (p. 15)

Outcome, "success/no success" data will be reviewed for the study, but, as is implied in the above, the question of"success" or lack of it, does not seem to be a clear-cut event in the context of "intentional causality."

B. Description of the Study*

1. Classes

The study was conducted in three classes, one each of Grade 2, Grade 3, and Grade 4. All classes are located in Chapter 1 Schoolwide Project sites, i.e., a minimum of 75% of the students are from families on AFDC (Aid for Dependent Children). In addition, some of the classes are located at schools which participate in the Adaptive Learning Environments Model (ALEM). The ALEM program has two major emphases: 1) Adaptive Instruction: Individualized Progress Plans; The Diagnostic-Prescriptive Monitoring System; and The Self-Schedule System, and 2) Supportive Systems for Implementation: The Adaptive Program Delivery System; The Data-Based Staff Development Program; School and Classroom Organizational Supports; and Family Involvement. Plans are also underway to try the approach with several gifted classes.

There were five (5) visits--a minimum of one (1) hour each visit before mid-year citywide tests (mid-January).

* The interest and cooperation of the principals, teachers and students at the schools involved is gratefully acknowledged.

2. The Approach

The approach--a term considered more applicable to this type of study than either "intervention," on the one hand, or "design" on the other--essentially consisted of the following steps outlined in the document in Appendix A, "Question-Writing Capability As a Means of Developing Self-Directed Learning." This document was presented to and discussed with each teacher as the rationale/description of the study and its basic procedures.

The item-writing process used in the study was clearly positioned close to the "item specification" end of what Millman and Greene (1989) refer to as the item-writing continuum:

> Item writing can be viewed along a continuum. At one end, the content of the test question emanates from the thoughtfulness and creativity (some would say, idiosyncrasy) of the item writer. As Wesman has said, "Every test item begins with an idea in the item writer. . . There is no automatic process for the production of item ideas. They must be invented. . ." . . . A Technology for Itest-Item Writing (Roid and Haladyna, 1982) is invoked as one moves toward the other end of the continuum, in which an item is not so much written as it is generated. It is produced by formulas. . . rather than by trial and taste of the creative worker. The continuum is one of increasing specificity and constraints on the item writer's inventiveness. (p. 349)

As noted earlier, this study/approach was undertaken on the assumption that, for students, working through a multiple-choice item-specification process would be the means of awakening their latent thinking, problem-solving, and writing abilities--not to mention test-taking abilities--which would provide the basis for them to be "inventive" throughout their school careers.

The usual routine followed in each visit to a class was: 1) the teacher would read a story/selection from a text the day before to prepare the class, 2) the actual hour spent with the class would begin with a quick review by me of what this was all about, i.e., the importance of becoming a self-directed learner, the importance of questions in general in this regard, and the particular benefits to self-directed learning of being able to write multiple-choice items, 3) the teacher would do a warm-up exercise, getting the students to produce lists of key nouns, verbs, adjectives and adverbs related to the reading--parallelling some of the adaptations of Bormuth's "item transformation" routines which Roid and Haladyna (1982) introduced, 4) next I would demonstrate how a "who" or "what" or "how," etc. question (multiple-choice format) could be produced based on the reading, and, finally, 5) for the remainder of the time, the teacher and I would work with small groups of students (4 or 5)--occasionally the process would involve an assignment for each individual student--in writing their own multiple-choice item. (The "concept mapping" routine referred to in the Appendix document--see, e.g., Novak and Gowin, 1984--was attempted to be introduced

several times, but it added a complicating dimension that would require more time to solve--and make a facilitating element--*than was currently available; it will continue to be worked on as* time permits.)

The next steps are seen to be of the following order: working with the teachers so that they are able to a) present the class with test specifications--brief test--in a selected area as an assignment (assigning different types of questions to groups and/or individuals), b) have the students generate the multiple-choice items--different for different groups, etc.--necessary to meet the specifications, c) have the different groups enter their--reviewed/approved-items in the school's PC's, d) print out the combined items as a test for the whole class, e) have the students score their own tests--the members of each different group should have the advantage regarding the items they generated, f) conduct an item analysis through a show of hands, g) direct the subsequent teaching to the areas of weakness identified by the test and/or the badly performing items, h) let the teachers become convinced that this will gradually allow a continuously interactive teaching/testing cycle in which the students have an integral part, and which, consequently, will develop a sound form of self-directed learning in each of the students, while allowing the teacher to play a different kind of role, becoming a manager and director of self-motivating learners, rather than little children needing to be "taught" everything at each step.

The final goal of this study/approach is to have the teachers become advocates themselves of the basic concepts and strategies involved, and begin disseminating their success with the approach to their colleagues at faculty meetings and staff development sessions.

C. Findings to Date

During the time spent working with the students and the teachers at each of the five sessions in each school, the students' active engagement in the process was evident. There were varying degrees of understanding of what the work was all about at the beginning. By the end of the third week, even in the Grade 2 class, which functioned as a transition class, there was a good deal of realization on the part of almost all students, of what constituted the most crucial aspects of the activity, of how important it was to frame one correct answer and several "good wrong" options, and of how much thought it took to work through this whole chain of possible answers to questions.

Each of the teachers indicated that the process had been beneficial, and each was happy to continue working with it. They looked forward to taking it to the point where the students developed and analyzed their own tests. The teachers thought the approach was particularly helpful in developing thinking skills and reinforcing good test-taking skills. They did not see it as a particular contribution to the development of writing skills, possibly because the students were too preoccupied with correct

possibly because the students were too preoccupied with correct spellings and not enough with translating concepts into written form. They thought having the students work in small groups was particularly effective. Some typical teacher reactions:

- This helps their thinking skills, makes them understand the "wh" words.
- Having the students work in groups, with a top students in each group, was a big help.
- This helped them to think more clearly, to organize their ideas better.
- They seemed to work better together in problem-solving tasks as a result.
- The experience has helped the class in many ways, especially in improving their thinking.
- I give the class item-writing assignments for homework and have them develop their own tests.
- Showing the students how to write their own items has really helped their test-taking skills.
- When they were taking the city-wide tests, they really worked hard at doing well, and I think this helped them act that way.

In another area related to study findings, base line achievement data have been collected, and achievement outcomes

will be found in Appendix B based on mid-year data, expected to be available by late March, early April, 1990.

V. CONCLUDING STATEMENT

This "reflective inquiry" into the feasibility of teaching students how to write multiple-choice items as a means of developing self-directedness has so far proven to have some merit. According to the teachers, it has at least been a means of promoting clearer thinking and has reinforced serious attention to test-taking and good test-taking skills. It is also, apparently, a good cooperative learning exercise for developing problem-solving skills.

The teachers want to continue working with this activity and are looking forward to having the students develop, administer, and analyze the results of their own tests.

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APPENDIX A

QUESTION-WRITING CAPABILITY AS A MEANS OF DEVELOPING SELF-DIRECTED LEARNING

I. PREMISES

A. Students become more and more successful as learners the more they become self-directed in learning.

B. An important way to develop self-directedness is to develop an appreciation for the value of questions. This appreciation includes:

1. Seeing that learning is essentially a matter of knowing how to question.

2. Seeing the importance of being able to ask the right question at the right time.

3. Seeing that it is not so important to have every answer at your fingertips as knowing how to find the answers to questions.

4. Seeing the importance of developing a questioning mind, one that continually tries to understand who and what are connected, and when and where, and how and why things are connected.

C. Developing question-asking capabilities includes being at ease with, i.e., able to formulate as well as respond to:

1. The usual form of *open-ended question* which calls for the developer to phrase a good, precise question, e.g., "What are some of the things Americans should be grateful for on Thanksgiving Day?", calling for the respondents to supply an answer in their own words, and

2. The *multiple-choice type* of item (question), where the format calls for the developer to think through a series of good, possible responses, only one of which is the best response, and where the respondent has to be able to select this one best response from all the others.

D. Without minimizing the importance of being able to formulate and respond to the usual type of open-ended question, the value to the student of being able to formulate the type of question/response interaction required in a good multiple-choice item (question) tends to be overlooked. Developing this type of item (question) can promote:

1. *Thinking* skills

2. *Writing* skills

3. *Test-taking* skills

II. AN APPROACH TO DEVELOPING MULTIPLE-CHOICE ITEM-WRITING SKILLS IN STUDENTS

(The focus here is primarily on reading, science and social studies--verbal--material, rather than mathematics, though somewhat similar techniques apply to math.)

A. Ask the teacher to read a story/a section of a science or social studies text to a class (or a designated group of students) the day before.

B. Review for the students the premises outlined above regarding the importance of question-asking for developing self-directedness.

C. Acquaint the students with the two techniques of:

1. *Key word lists*

2. *Concept mapping*

D. Show the students how to list the key parts of speech (nouns, verbs, adjectives, adverbs) found in the story/ text, and then how to use these in multiple-choice formats to ask questions about:

1. Who
2. What
3. Where
4. When
5. Why
6. How

E. Or use the concept mapping approach to link key concepts (things/events) together to develop a skeleton of the basic ideas behind a character, a situation, an explanation, etc. and then translate these into who, what, etc. multiple-choice questions, as above.

F. For both the key word list and concept mapping approach, show the students how to develop:

1. Easy items, i.e., where the best choice is very obvious, and

2. More difficult items, i.e., where through the use of paraphrase, synonyms, etc. each of the distractors (incorrect options) have to be thought about before being rejected.

3. The whole process into a game of how to use words to simultaneously disguise the right answer while making the process of elimination as thought-provoking as possible.

III. SOME FUTURE POSSIBILITES

A. A class might begin to set up a friendly form of competition with another class--if faculty members become intrigued and disseminate the process to a wider series of classes in a school--and begin to develop whole informal tests, based on this approach, so that they can help one another in this kind of question-asking capability and its overall benefits.

B. A class might want to begin writing and storing its items on a computer so that a real form of student-originated item-banking begins to be developed in the school that can expand and become as useful and more sophisticated as student/staff interest will allow.

APPENDIX B

ACHIEVEMENT DATA

The achievement information included in this Appendix provides student performance information in reading for the three classes which participated in the study. The data relate to performance on the reading tests of the School District's citywide tests (introduced in 1984-1985), with data current through the most recent test administration in January, 1990. The citywide tests have both a national norm referenced dimension (embedded items from the Comprehensive Test of Basic Skills: CTBS-U, 1981), and a local curriculum referenced dimension (the School District's Standardized Curriculum). The achievement data are included in order to provide as complete a context for the study as possible, and to fulfill the promised gesture regarding achievement "outcomes" in the form of some initial empirical grounding in as many areas as available. The data are not provided, however, in an attempt to make the study anything other than the essentially reflective inquiry it has consistently tried to present itself as being. Given this intent, the study could not realistically look for "outcomes" in the true sense in this area, i.e., in terms of direct, immediate effects on these kinds of measures--but long term, indirect effects in this area in the future would clearly not be undesirable.

All the data in the following seven tables are descriptive, and the statistics are presented as summarizing devices regarding the populations of the three grades involved, and not as sources of

inference to any larger population. Each table is explained below, with some brief commentary:

1. Table 1 provides national norm data from the citywide tests. The number and percentage of students scoring below the national 16th percentile and at or above the national 50th percentile are presented for each class. Information is provided in these terms for the current (1989-1990: January, 1990) year, for the previous year, and for two years previous in the case of the Third and Fourth Grade classes; this last form of data was not available for the Second Grade class. As is evident in the table, the Third Grade students have shown a consistent decrease in percentages below the 16th percentile. As regards percentages at/above the 50th percentile, both Third and Fourth Grade classes showed a positive upturn in the current testing after a downturn last year.

2. In Table 2, similar information is presented as above, but in local (Philadelphia) percentile terms. The performance for each group below the 16th percentile is fairly similar to national norm performance, but in the area at/above the 50th percentile, current percentages are lower than for the previous year(s) for all three groups, although the Third Grade class had more than the expected 50% performing above the 50th percentile in January 1990.

3. The information in Table 3 is of a criterion-referenced nature and refers to the percentage of items correct on all the curriculum referenced items in the citywide test (in general, there is considerable overlap between the national norm referenced and the curriculum referenced items on the tests, but there are some separate items for each type). The table gives the three groups' performance, again going back to two years previous when possible, in terms of three percentage correct categories. The current picture shows a decrease at each site in the percentage of students with at least 75% of the items correct in reading.

4., 5., 6. Tables 4, 5 and 6 give complete frequency distributions by selected intervals in relation to national and local percentiles, and percentages of items correct respectively. This information gives the total context for the three previous tables, and also gives insights into why correlational analyses (rank order - RHO coefficient) comparing previous with current year performance yielded correlation coefficients of .27, .81, and .73 respectively for the three classes. Clearly there is no correlation between the two testings for the Second Grade class (note, however, that across the city Second Grade performance varies considerably from Grade 1 performance--perhaps a test difficulty factor and note also that this Second Grade class functioned as a transition class). The Grade 3 and Grade 4 classes show high correlations between the two testings.

7. Table 7 shows the gains in percentile (national and local) and the gains in percentages of items correct for the three groups

going back again to performance two years previously where possible. The Grade 4 class clearly shows the largest amount of gain consistently, both as regards performance two years ago and last year's performance, particularly the latter. It should be noted, however, that Chi-Square analyses of differences between (correlated) percentages above and below the national 50th percentile (previous year versus current year) were not significant for the two older classes. (Grade 3: Chi-Square= .33; df=1; Grade 4: Chi-Square=1.29, df=1) When ANOVA was performed across the three years' performance for these two groups, it seemed to confirm student differentials, regardless of when the test were administered. (Grade 3: Students F=7.16; p=<.01; Tests F=3.19; p=>.05; Grade 4: Students F=6.67; p=<.01; Tests F=.54; p=>.05)

As a concluding statement, it should again be pointed out that the achievement data reported in this Appendix are in the interest of context elaboration and not for the purpose of providing "outcomes" in the truest sense of that term. Once again, this kind of study is not geared to developing a project of any specific kind but is intended to yield a workable strategy for multiple-choice item writing on the part of students that can be taken over and refined by a teacher and built into regular class routines. If this can be accomplished, it seems that test scores could well be affected, but the target is especially the development of thinking skills that will influence student performance on many different kinds of achievement measures. As regards the study itself and the item-writing strategy involved, it is only a beginning, and there is a need

for more time and try-outs to bring it to the point where it can clearly offer benefits to teachers and students.

CITYWIDE TEST DATA

TABLE 1: National Norms: Percentages Below the 16th Percentile and At/Above the 50th Percentile

CLASS/ GRADE	NUMBER (N) AND PERCENTAGE (%) BELOW THE NATIONAL 16TH PERCENTILE									NUMBER (N) AND PERCENTAGE (%) AT/ABOVE THE NATIONAL 50TH PERCENTILE								
	Two Years Previous			Previous Year			Current 89-90 Year			Two Years Previous			Previous Year			Current 89-90 Year		
	Total N	N	%	Total N	N	%	Total N	N	%	Total N	N	%	Total N	N	%	Total N	N	%
Grade 2	- -	- -	- -	12	3	25%	16	6	38%	- -	- -	- -	12	4	33%	16	2	13%
Grade 3	22	7	32%	19	4	21%	25	2	8%	22	13	59%	19	6	32%	25	10	40%
Grade 4	24	3	13%	26	4	15%	27	5	19%	24	8	33%	26	8	31%	27	12	44%
TOTALS	46	10	22%	57	11	19%	68	13	19%	46	21	46%	57	18	32%	68	24	35%

TABLE 2: Local (Philadelphia) Norms: Percentages Below the 16th Percentile and At/Above the 50th Percentile

CLASS/ GRADE	NUMBER (N) AND PERCENTAGE (%) BELOW THE LOCAL 16TH PERCENTILE									NUMBER (N) AND PERCENTAGE (%) AT/ABOVE THE LOCAL 50TH PERCENTILE								
	Two Years Previous			Previous Year			Current 89-90 Year			Two Years Previous			Previous Year			Current 89-90 Year		
	Total N	N	%	Total N	N	%	Total N	N	%	Total N	N	%	Total N	N	%	Total N	N	%
Grade 2	- -	- -	- -	12	0	0%	16	4	25%	- -	- -	- -	12	6	50%	16	5	31%
Grade 3	22	1	5%	19	3	16%	25	3	12%	22	14	64%	19	13	68%	25	14	56%
Grade 4	24	1	4%	26	4	15%	27	6	22%	24	13	54%	26	13	50%	27	13	48%
TOTALS	46	2	4%	57	7	12%	68	13	19%	46	27	59%	57	32	56%	68	32	47%

TABLE 3: Percentages of Items Correct: Curriculum-Referenced Items-Citywide Tests

CLASS/ GRADE	LESS THAN TWO-THIRDS OF THE ITEMS (65% OR LESS CORRECT)								
	Two Years Previous			Previous Year			Current 89-90 Year		
	Total N	N	%	Total N	N	%	Total N	N	%
Grade 2	- -	- -	- -	12	3	25%	16	7	44%
Grade 3	22	8	36%	19	6	32%	25	9	36%
Grade 4	24	14	58%	26	11	42%	27	11	41%
TOTALS	46	22	48%	57	20	35%	68	27	40%

CLASS/ GRADE	BETWEEN TWO-THIRDS AND THREE-QUARTERS (66% - 74% CORRECT)								
	Two Years Previous			Previous Year			Current 89-90 Year		
	Total N	N	%	Total N	N	%	Total N	N	%
Grade 2	- -	- -	- -	12	3	25%	16	4	25%
Grade 3	22	0	0%	19	0	0%	25	4	16%
Grade 4	24	1	4%	26	3	12%	27	5	19%
TOTALS	46	1	2%	57	6	11%	68	13	19%

CLASS/ GRADE	AT LEAST THREE-QUARTERS (75% AND HIGHER) OF THE ITEMS CORRECT								
	Two Years Previous			Previous Year			Current 89-90 Year		
	Total N	N	%	Total N	N	%	Total N	N	%
Grade 2	- -	- -	- -	12	6	50%	16	5	31%
Grade 3	22	14	64%	19	13	68%	25	12	48%
Grade 4	24	9	38%	26	12	46%	27	11	41%
TOTALS	46	23	50%	57	31	54%	68	28	41%

CITYWIDE TEST DATA (CONT'D)

TABLE 4: Frequency Distributions by Grades and Years in Relation to National Norm Intervals

CLASS/ GRADE	Years	National Percentile Intervals								
		Below 16th %ile	16th - 19th %ile	20th - 29th %ile	30th - 39th %ile	40th - 49th %ile	50th - 59th %ile	60th - 69th %ile	70th %ile & Above	Totals
Grade 2	2 Yrs Previous	- -	- -	- -	- -	- -	- -	- -	- -	- -
	Previous Yr	3	2	1	2	0	2	1	1	12
	89/90 Curr Yr	6	1	5	1	1	1	0	1	16
Grade 3	2 Yrs Previous	7	1	0	1	0	1	1	11	22
	Previous Yr	4	2	1	3	3	2	2	2	19
	89/90 Curr Yr	2	1	2	9	1	4	0	6	25
Grade 4	2 Yrs Previous	3	1	5	5	2	2	4	2	24
	Previous Yr	4	3	4	3	4	3	1	4	26
	89/90 Curr Yr	5	0	2	2	6	4	4	4	27
TOTALS	2 Yrs Previous	10	2	5	6	2	3	5	13	46
	Previous Yr	11	7	6	8	7	7	4	7	57
	89/90 Curr Yr	13	2	9	12	8	9	4	11	68

CITYWIDE TEST DATA (CONT'D)

TABLE 5: Frequency Distributions by Grades and Years in Relation to Local Percentile Intervals

CLASS/ GRADE	Years	National Percentile Intervals								
		Below 16th %ile	16th - 19th %ile	20th - 29th %ile	30th - 39th %ile	40th - 49th %ile	50th - 59th %ile	60th - 69th %ile	70th %ile & Above	Totals
Grade 2	2 Yrs Previous	- -	- -	- -	- -	- -	- -	- -	- -	- -
	Previous Yr	0	0	5	1	0	1	4	1	12
	89/90 Curr Yr	4	1	1	1	4	2	2	1	16
Grade 3	2 Yrs Previous	1	2	4	1	0	0	2	12	22
	Previous Yr	3	0	2	1	0	3	2	8	19
	89/90 Curr Yr	3	1	1	2	4	2	3	9	25
Grade 4	2 Yrs Previous	1	0	4	2	4	2	5	6	24
	Previous Yr	4	3	3	1	2	1	5	7	26
	89/90 Curr Yr	6	0	0	4	4	2	2	9	27
TOTALS	2 Yrs Previous	2	2	8	3	4	2	7	18	46
	Previous Yr	7	3	10	3	2	5	11	16	57
	89/90 Curr Yr	13	2	2	7	12	6	7	19	68

CITYWIDE TEST DATA (CONT'D)

TABLE 6: Frequency Distributions by Grades and Years in Relation to Intervals of Percentages of Items Correct

CLASS/ GRADE	Years	Intervals of Percentages of Items Correct				
		Less than 50% Correct	50% - 65% Correct	66% -74% Correct	75% and Higher Correct	TOTALS
Grade 2	2 Yrs Previous	- -	- -	- -	- -	- -
	Previous Yr	0	3	3	6	12
	89/90 Curr Yr	1	6	4	5	16
Grade 3	2 Yrs Previous	2	6	0	14	22
	Previous Yr	3	3	0	13	19
	89/90 Curr Yr	4	5	4	12	25
Grade 4	2 Yrs Previous	3	11	1	9	24
	Previous Yr	6	5	3	12	26
	89/90 Curr Yr	6	5	5	11	27
TOTALS	2 Yrs Previous	5	17	1	23	46
	Previous Yr	9	11	6	31	57
	89/90 Curr Yr	11	16	13	28	68

CITYWIDE TEST DATA (CONT'D)

TABLE 7: **Number (N) and Percentage (%) of Students by Grade Improving a) National Percentile Ranks or b) Local Percentile Ranks or c) Percentage of Items Correct from Two Years Previous to Current Year or Previous Year to Current Year**

CLASS/ GRADE	Improvement* in National %ile Rank				Improvement* in Local %ile Rank				Improvement* in % of Items Correct			
	From 2 Years Previous to 1989-1990 Current Year		From Previous to 1989-1990 Current Year		From 2 Years Previous to 1989-1990 Current Year		From Previous to 1989-1990 Current Year		From 2 Years Previous to 1989-1990 Current Year		From Previous to 1989-1990 Current Year	
	N	%	N	%	N	%	N	%	N	%	N	%
Grade 2	- -	- -	3 of 12	25%	- -	- -	4 of 12	33%	- -	- -	3 of 12	25%
Grade 3	9 of 22	41%	11 of 19	58%	5 of 22	23%	9 of 19	47%	5 of 22	23%	4 of 19	21%
Grade 4	16 of 24	67%	15 of 26	58%	7 of 24	29%	14 of 26	54%	12 of 24	50%	14 of 26	54%
TOTALS	25 of 46	54%	29 of 57	51%	12 of 46	26%	27 of 57	47%	17 of 46	37%	21 of 57	37%

* Improvement in all cases had to be at least by 2 percentile or percentage points--in most cases the amount of improvement was more than 2 points.